

## Influence of Treatment on the Gluing of Rubber Veneer

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Wood destroying agents which attack wood also attack wood products. It is well known that preservation plays an important role in the use of naturally non-durable species of wood and wood products by increasing its service life. Similarly preservative treated plywood has a greater service life. The common preservatives for composites are boric acid and borax. These compounds are effective against decay and sap staining fungi and wood destroying insects. Rubber wood (*Hevea braziliensis*) is a non-durable species and susceptible to fungal and insect attack quickly after sawing. It is assumed that without preservative treatment rubber wood could not be a suitable raw material for plywood and particleboard manufacture. Veneer obtained both from sapwood and hardwood of non-durable timber species when used for plywood manufacture should be soaked in 1.25% solution of boric acid or 1.90% solution of borax at a temperature of 93°C to 100°C for a period of 10 to 40 minutes depending on species and thickness of the veneer (Anon. 1983). With this aim in view the present study has been undertaken.

Rubber wood veneer was supplied by Sanguvally Timber Industries, Dohazari, Chittagong. Three-ply plywoods were made with these veneers grouping them in three categories. Nine pieces of veneer were treated with 2% boric acid solution at 60°C for 2 minutes. Then the veneers were solid stacked for one hour to allow uniform diffusion of the preservative solution into the veneer. Another nine veneers were treated with 3% borax solution maintaining the same temperature and time. The

treated veneers were dried in the oven to about 8% moisture content. The rest nine untreated veneers were kept for control samples. Then they were glued into three-ply plywood panels using liquid urea formaldehyde glue of 50% solid content. The glue was extended with 20% wheat flour and catalyzed with 2% hardener on the basis of solid urea formaldehyde.

The glued veneers were then hot pressed using the following schedule:

Open assembly time	: 3 minutes
Closed assembly time	: 2 minutes
Specific pressure	: 200 PSI (14.0 kg cm <sup>-2</sup> )
Press temperature	: 120°C (240°F)
Press time	: 5 minutes

Three panels were made for each treatment condition. Twenty standard glue shear test samples and one delamination test samples were prepared from each panel. Prior to testing, the samples were conditioned until they attained a uniform moisture content of 10%. The dry shear test, wet shear test and delamination test were performed according to BDS 1090:1984.

The load at failure and the glue failure in dry and wet shear test of boric and borax treated and untreated plywood with the moisture content are given in Table 1. From the result it is found that the glue bond strength of untreated plywood is 28 kg cm<sup>-2</sup> which is higher than the boric and borax treated plywood. Dost (1971) explained that urea-formaldehyde resin cures at a low p<sup>H</sup> level produced

**Table 1.** Results of gluing of rubber veneer.

Treatment	Moisture content (%)	Dry shear test		Wet shear test		Delamination test
		Load at failure (kg cm <sup>-2</sup> )	Glue failure (%)	Load at failure (kg cm <sup>-2</sup> )	Glue failure (%)	
Untreated	16	28	8	24	15	Passed
Borax treated	16	23	4	22	13	Passed
Boric treated	16	25	1	22	20	Passed

by the addition of hardener. Boric acid decreases p<sup>H</sup> level. The cumulative effect due to hardener and boric acid might have produced low p<sup>H</sup> and thus impaired the curing of the resin and produced a lower bond strength. Kollman *et al.* (1975) also stated that the reduction of p<sup>H</sup> level shortens the pot life of glue, and strength of glue joints is deteriorated in the plywood made with treated veneer. However, the glue bond strength meets 'A' grading requirement for gluing (Sheikh *et al.* 1993). The percentage of glue failure is a prerequisite criteria in selecting the shear specimens for determining the bonding strength of a species. According to the standard

(Anon.1984) if the glue failure for individual test specimen goes above 50%, the load at failure for that specimen needs to be discarded. In the present study for both dry and wet shear tests, glue failure is negligible showing the excellent bonding of both untreated and treated veneers. Plywood made with untreated and treated veneers using the said adhesive passed the delamination test in cold water.

It is concluded that preservative treatment of rubber veneer does not affect gluing. However, the mycological test of preservative treated product to observe its resistance towards microorganism needs to be investigated.

## References

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